What is claimed is:

1. A two-wire bus instrument (500) adapted for use with a two-wire bus (308), comprising an instrument element (304) that receives a third current and that generates one or more sensor measurement signals, a signal processor (512) that receives a second current and that processes the one or more sensor measurement signals from the instrument element (304) to produce a data signal, and a communication system (511) that receives a first current and that receives the data signal from the signal processor (512), generates a digital communication signal including the data signal, and modulates the digital communication signal onto the two-wire bus (308);

wherein the two-wire bus instrument (500) is further characterized by:

a communication power supply (501) connected to the communication system (511) and wherein the communication power supply (501) and the communication system (511) are capable of being connected across the two-wire bus (308), with the communication power supply (501) being configured to provide the first current, a substantially constant voltage, and a first power to the communication system (511);

a signal processing power supply (502) connected to the signal processor (512) and wherein the signal processor (512) and the signal processing power supply (502) are capable of being connected across the two-wire bus (308) and in parallel with the communication power supply (501) and the communication system (511), with the signal processing power supply (502) being configured to provide the second current, a substantially constant voltage, and a second power to the signal processor (512);

a drive current power supply (503) connected to the instrument element (304) and wherein the instrument element (304) and the drive current power supply (503) are capable of being connected across the two-wire bus (308) and in parallel with the communication power supply (501) and the communication system (511) and further in parallel with the signal processing power supply (502) and the signal processor (512), with the drive current power supply (503) being configured to provide the third current, a substantially constant voltage, and a third power to the instrument element (304).

2. The two-wire bus instrument of claim 1, wherein the two-wire bus instrument comprises a flowmeter transmitter.

3. The two-wire bus instrument of claim 1, wherein the two-wire bus instrument comprises a flowmeter transmitter and the instrument element comprises at least one flowtube driver and one or more pickoff sensors.

4. The two-wire bus instrument of claim 1, wherein the two-wire bus instrument comprises a Coriolis flowmeter transmitter.

5. The two-wire bus instrument of claim 1, wherein the two-wire bus instrument is substantially Intrinsically Safe (I.S.).

6. The two-wire bus instrument of claim 1, wherein an impedance of the two-wire bus instrument is substantially constant while the two-wire bus instrument is conducting communications.

7. The two-wire bus instrument of claim 1, wherein a change to the third current flowing through the instrument element is limited to frequencies that do not interact with communication frequencies of the two-wire bus.

8. A two-wire bus instrument (600) adapted for use with a two-wire bus (308), comprising an instrument element (304) that receives a third current and that generates one or more sensor measurement signals, a signal processor (512) that receives a second current and that processes the one or more sensor measurement signals from the instrument element (304) to produce a data signal, and a communication processor (616) that receives a first current and that receives the data signal from the signal processor (512), generates a digital communication signal including the data signal, modulates the digital communication signal onto the two-wire bus (308), and transfers a first current level command to a communication power supply (501);

wherein the two-wire bus instrument (600) is further characterized by:

the communication power supply (501) connected to the communication processor (616) and wherein the communication power supply (501) and the communication processor (616) are capable of being connected across the two-wire bus (308), with the communication power supply (501) being configured to provide the first current, a substantially constant voltage, and a first power to the communication processor (616),

wherein the first current is provided substantially according to the first current level command;

a voltage step-down device (604) connected between a signal processing power supply (502) and the signal processor (512) and configured to supply a predetermined voltage level to the signal processor (512);

a shunt voltage regulator (605) connected to the signal processing power supply (502) and the voltage step-down device (604), wherein the shunt voltage regulator (605) shunts excess current not required by the signal processor (512);

the signal processing power supply (502) connected to the voltage step-down device (604) and the shunt voltage regulator (605) and wherein the signal processing power supply (502), the signal processor (512), the voltage step-down device (604), and the shunt voltage regulator (605) are capable of being connected across the two-wire bus (308) and in parallel with the communication power supply (501) and the communication processor (616), with the signal processing power supply (502) being configured to provide the second current, a substantially constant voltage, and a second power to the signal processor (512);

a drive current power supply (503) connected to the instrument element (304) and wherein the instrument element (304) and the drive current power supply (503) are capable of being connected across the two-wire bus (308) and in parallel with the communication power supply (501) and the communication processor (616) and further in parallel with the signal processing power supply (502), the signal processor (512), the voltage step-down device (604), and the shunt voltage regulator (605), with the drive current power supply (503) being configured to provide the third current, a substantially constant voltage, and a third power to the instrument element (304).

9. The two-wire bus instrument of claim 8, wherein the two-wire bus instrument comprises a flowmeter transmitter.

10. The two-wire bus instrument of claim 8, wherein the two-wire bus instrument comprises a flowmeter transmitter and the instrument element comprises at least one flowtube driver and one or more pickoff sensors.

11. The two-wire bus instrument of claim 8, wherein the two-wire bus instrument comprises a Coriolis flowmeter transmitter.

12. The two-wire bus instrument of claim 8, wherein the two-wire bus instrument is substantially Intrinsically Safe (I.S.).

13. The two-wire bus instrument of claim 8, wherein an impedance of the two-wire bus instrument is substantially constant while the two-wire bus instrument is conducting communications.

14. The two-wire bus instrument of claim 8, wherein a change to the third current flowing through the instrument element is limited to frequencies that do not interact with communication frequencies of the two-wire bus.

15. A method of forming a two-wire bus instrument, comprising an instrument element that receives a third current and that generates one or more sensor measurement signals, providing a signal processor that receives a second current and that processes the one or more sensor measurement signals from the instrument element to produce a data signal, and providing a communication system that receives a first current and that receives the data signal from the signal processor, generates a digital communication signal including the data signal, and modulates the digital communication signal onto the two-wire bus;

wherein the method is further characterized by:

providing a communication power supply connected to the communication system and wherein the communication power supply and the communication system are capable of being connected across the two-wire bus, with the communication power supply being configured to provide the first current, a substantially constant voltage, and a first power to the communication system;

providing a signal processing power supply connected to the signal processor and wherein the signal processor and the signal processing power supply are capable of being connected across the two-wire bus and in parallel with the communication power supply and the communication system, with the signal processing power supply being configured to provide the second current, a substantially constant voltage, and a second power to the signal processor;

providing a drive current power supply connected to the instrument element and wherein the instrument element and the drive current power supply are capable of being connected

across the two-wire bus and in parallel with the communication power supply and the communication system and further in parallel with the signal processing power supply and the signal processor, with the drive current power supply being configured to provide the third current, a substantially constant voltage, and a third power to the instrument element.

16. The method of claim 15, wherein the two-wire bus instrument comprises a flowmeter transmitter and the instrument element comprises at least one flowtube driver and one or more pickoff sensors.

17. The method of claim 15, wherein the two-wire bus instrument comprises a Coriolis flowmeter transmitter.

18. The method of claim 15, wherein an impedance of the two-wire bus instrument is substantially constant while the two-wire bus instrument is conducting communications.

19. The method of claim 15, wherein the two-wire bus instrument is substantially Intrinsically Safe (I.S.).